

shaft 15 of the curved lever 14 passing through it for its entire length. The shaft 13 of the bell-crank lever enters the third bearing bore from both sides, but leaves open the space between the coupler members 20 to provide play for the movement of the swing arm 18. As may readily be recognized, this form of embodiment is completely symmetrical with respect to its central horizontal cross-sectional plane. As may also be easily seen, the bell-crank lever 12 and the curved lever 14 are coupled to one another by means of their shafts 13 and 15 via the two coupler members 20. The coupler members further guide the swing arm 18 via the bearing bolt 21 and thus, via the bearing bolt 17 and the boss 16 of the bearing block 9 of the bearing-surface part 6, guide the door panel 7 in the course of the pivoting movement about the shaft 10. The selected shapes and dimensions of the brackets 1 of the bearing-surface part 6, with the associated bearing block 9, the bell-crank lever 12, the curved lever 14, the boss 16, the swing arm 18 and the coupler members 20, as well as the disposition of the base shafts 2, 4 and the movable shafts 10, 13, 15, 17 and 21 have as a consequence the fact that upon the opening of the door, the door panel is positively guided by means of the lever mechanism such that the door opening is left entirely clear whether the door is opened to 90° or 180°. It should be emphasized that in the cooperation of the members of the lever mechanism, the pivoting movement of these members has already virtually ended once the door has been opened to an angle of 90°, and during the further opening to an angle of up to 180° the only substantial movement which continues to take place is a rotational movement about the shaft 10 in the bearing-surface part 6, and this is chiefly on the part of the curved lever 14 and the swing arm 18 upon a rotational movement of the coupler members 20 about the shaft 13.

Upon closer consideration, it is found that one arm 12' of the bell-crank lever 12 and the curved lever 14, along with the arm 3 of the bracket 1 and the stationary shafts 2 and 4 as a base as well as the triangular coupler members 20 acting as a unitary coupler and having the stationary shafts 13, 15 form a 4-bar link-mechanism, one lever of which is the arm 12'; the lever is extended, however, beyond the arm 12', with a right-angle bend and an additional curvature, in the form of the arm 12'', which in the terminal position engages the shaft 10 guided by means of the bearing 9 in the bearing-surface part 6. The swing arm 18 is furthermore supported at 21 on the coupler members 20 of this link mechanism; in its final position, the swing arm 18 engages the bearing tang 17, offset parallel to the shaft 10, of the boss 16 of the bearing-surface part 6.

This last-mentioned arrangement thus forms a second 4-bar link mechanism with the boss 16 disposed in a stationary manner in the bearing-surface part 6 as a base, the arm 12'' of the bell-crank lever 12 as one, [sic] the swing arm 18 as a corresponding lever and the coupler 20 as the final member. The two 4-bar link mechanisms are articulated relative to one another via the coupler 20 and are rigidly connected with one another via the lever 12, since one arm 12' of the lever is part of the first 4-bar link mechanism and the other arm 12'' is part of the second 4-bar link mechanism.

In FIGS. 4a, b, c the attempt has been made to make the not-readily-apparent relationships between the members of the lever link mechanism and its movements more comprehensible by means of a highly schematic illustration. In so doing, it was not possible to represent the proportional size of the members to scale.

FIGS. 4a, b and c correspond to the closed or open positions shown in FIGS. 1, 2 and 3. The reference numerals correspond to those used in the foregoing description of the non-schematic drawings, FIGS. 1-3.

List of reference numerals

- 1—Bearing surface, bracket
- 2—stationary first shaft
- 3—first arm of U
- 4—stationary second shaft
- 5—second arm of U
- 6—bearing-surface part
- 7—door panel
- 8—first arm of bearing-surface part 6
- 9—bearing block on 8
- 10—shaft of lever mechanism
- 11—fastening arm of 6
- 12—bell-crank lever

12' — one arm
 12'' — the other arm

} of the bell-crank lever

- 13—angle shaft
- 14—curved lever
- 15—shaft at end of 14 (connection to coupler)
- 16—boss of the bearing block
- 17—bearing bolt in boss 16
- 18—swing arm
- 20—coupler or coupler members
- 21—bearing bolt in coupler 20 for swing arm 18
- 2—stationary first base shaft on bracket 1
- 4—stationary second base shaft on bracket 1
- 10—first base shaft on bearing-surface part 6
- 17—second base shaft on boss 16
- 13—shaft in angle of bell-crank lever
- 15—shaft at end of curved lever
- 21—bearing bolt for swing arm 18 on coupler 20

I claim:

1. A hinge hardware element for building and furniture doors and windows, which after opening 90 degrees to 180 degrees leaves the inside cross-section of the door or window opening entirely clear, having a fastening part attached to the jamb and a bearing-surface part attached to the door, which parts are connected with one another by way of a lever mechanism, said lever mechanism including in combination:

- (a) a first 4-bar link mechanism having a first base attached to the jamb; first and second spaced-apart parallel shafts extending from said base; a bell crank lever having a first arm pivoted at one end on said first shaft; a second lever member; a coupler; third and fourth shafts parallel to said first and second shafts, said third shaft pivotally interconnecting said coupler and the other end of said arm of said bell crank lever at the apex thereof, said fourth shaft interconnecting one end of said second lever member with said coupler, the other end of said second lever member being pivotally mounted on said second shaft; and
- (b) a second 4-bar link mechanism having a first part for attachment to the end face of a door panel; a second base extending from said first part; fifth and sixth spaced-apart shafts mounted on said second base and extending parallel to said first and second shafts; a second arm of said bell crank lever pivot-